Design Standards Letter

Letter Number: D-1960-19

Letter Date: 06/03/1960

Effective Date: 06/03/1960

Section/Plan No.: None

Subject: Median Drainage Pipe Under Fills Revised Upper Limits of Class 3 Excavation for Median Pipe and Fill

Body

TO ALL DIVISION, DISTRICT AND URBAN ENGINEERS:

We have recently received several inquiries concerning the design of broken-backpipe culverts for handling median drainage when the locating of drop inlets in sections of high fill could not be avoided. This matter of broken-back design was presented to the Design Committee about two years ago, at which time the policy of designing and constructing broken-back culverts was approved when justified by conditions and by a comparative estimate of installation cost.

It has heretofore been the policy for the Districts to design broken-back culverts when they considered such design appropriate, and to specify either rigid type or flexible type pipe from a point near the outer shoulder to and along the sideslope to the toe of fill. A certain amount of inconsistency and non-uniformity in policy application and culvert design have resulted from this optional treatment.

Possibly the greatest contributor to this has been the item of Class 3 Excavation. Treatment of this item respective to upper limits when in fill has varied considering comparative cost, application of the policy governing broken-back design has likewise varied accordingly.

In order to achieve a greater degree of uniformity in both application of policy and design, the following design criteria will hereafter be in effect:

1. Design a broken-back culvert where height of fill at outer shoulder is more than 10 feet, and the percent of slope between upper and lower flow lines is greater than 10 per cent.

2. Specify bituminous coated (paved invert) corrugated metal pipe for broken-back culverts from a point near outer shoulder to and along sideslope to toe of fill.

3. (a) Class 3 Excavation for broken-back median pipe under fill will be measured form a plane 1 foot above top of pipe at inlet end and extending on true horizontal plane the full width from inlet to outer sideslope.

(b) class 3 Excavation for straight pipe type under fill will be measured below the elevation of the upper flow line from a true horizontal plane extending from inlet to outer sideslope.

A sketch has been prepared showing the above design data, together with other information considered pertinent to broken-back culvert design. A print of this sketch is attached for your information and use.

Item 1 above is based upon a recent study made by this office in an effort to determine if one common break point in economy could be established for selecting design type, either from height of fill or form pipe slope. The prescribed maximum slope of 10 percent for straight pipe will not prove to be the exact break point in economy for all pipe sizes. Nevertheless, it should be used in all cases for the sake of uniformity and expediency in design.

The Stand Drawings for Drop Inlets 36E and 36EE will be revised as soon as possible to show the upper limits of Class 3 Excavation in conformity with those noted in Item 3 above. However, until notice is received of the revision of these standards, it is requested that the upper limits of Class 3 Excavation for median pipe under fill be shown on culvert sections.

C. C. Tevis
Engineer of Surveys and Plans